

REMARKS

Favorable reconsideration and allowance of this application are requested.

I. Discussion of Claim Amendments

Independent claims 14 and 26 have each been amended so as to clarify that the curing agents employed in the respective sequential vulcanization steps are each independently selected from the group consisting of phenolic resins, siloxane compounds, peroxides, sulfur, sulfurous compounds and mixtures thereof. Claim 25 has been revised so as to clarify that the curing agents are each independently selected from the group consisting of phenolic resins, siloxanes, peroxides and mixtures thereof. Newly presented claim 40 has been presented and is substantively similar to the amended version of claim 25, but is dependent form independent claim 26.

Support for the claim amendments and new claims presented above can be found on page 3, lines 21-26 as well as original claims 13 and 25 (which constitutes their own disclosure).

Therefore, following entry of this amendment, claims 14-40 will be pending herein for which favorable reconsideration is requested.

II. Response to Art-Based Rejections

A. Response to 35 USC §102(b) Rejection based on Wang et al (USP 5,963,039)

Wang et al discloses in example 1, Table I a process wherein the rubber is only cured once. Specifically, in that example it is explicitly stated that “uncured masterbatch” is employed and *only* in the second step is phenolic resin added to cure the EPDM rubber.

Apparently, the reason the reason the Examiner Wang et al is that in example 1, ZnO is added to the EPDM rubber. While, the present specification does in fact note on page 3, lines 21-22 that suitable curing agents may include "metal oxides", the applicants have observed that zinc oxide is not a good crosslinker for EPDM by itself. Thus, ZnO may be used as an activator in combination with e.g. a sulfur or phenolic resin crosslinker. Therefore the group of curing agents now embraced by the pending claims does not include metal oxides, such as ZnO.

That ZnO by itself is not a good crosslinker for EPDM rubber is also evident from Wang et al itself where it is stated in column 9, line 32 that the masterbatch is *uncured* even though it is evident that ZnO is present in the composition and also from the wording in Table I, left column: 'Un-cured masterbatch'.

In the process according to the invention, ***the rubber is cured twice***. This multiple cure process according to the present invention has the following advantages as stated in the description on page 1, line 33 -page 2, line 4:

- improved mechanical properties (such as tensile strength, see page 1, lines 19-20)
- improved elastic properties
- improved fluid resistance
- possibly also a better compression set

These advantages are proven by the examples provided in the specification summarized below.

Comparative experiment A. examples 2 and 3 and table 2

Comparative experiment A shows the melt-mixing of oil-extended EPDM (Keltan P597™) and polypropylene homopolymer (= thermoplastic polymer), oil and a curing agent (phenolic resin) [see example 1] = compound 1. To compound 1 a polypropylene homopolymer was added and no curing agent [see comparative experiment A].

Example 2 and 3 also show the melt-mixing of oil-extended EPDM (Keltan P597™) and polypropylene homopolymer (= thermoplastic polymer), oil and a curing agent (phenolic resin) [see example 1] = compound 1. To compound 1 a polypropylene homopolymer was added and as a curing agent phenolic resin was added. In both examples the partially vulcanized rubber concentrate is melt-mixed with the other components; in the case of example 2 this was done using a twin screw extruder; in example 3 this was done using a single screw extruder.

Therefore, basically examples 2 and 3 exemplify the process according to the present invention and comparative experiment A exemplifies the process according to the invention, but **without** the second curing step – i.e., a process similar to Wang et al.

As can be seen from table 2, the compression set is improved with the material produced according to the process of the present invention as compared to comparative experiment A as the compression set is substantially lower for the material produced in examples 2 and 3. A lower compression set means that the permanent deformation of the material after the initial compression is released is less, which is of course advantageous for most TPE and TPV applications.

Furthermore, for the material produced in examples 2 and 3 as compared to the material of comparative experiment A, the oil swell is less. This indicates that with the process according to the invention, material is obtained with an improved fluid resistance.

Comparative experiment B. examples 4 and 5 and table 3

Comparative experiment B shows the melt-mixing of oil-extended EPDM (Keltan P597™) and polypropylene homopolymer (= thermoplastic polymer), oil and a curing agent (phenolic resin) [see example 1] = compound 1. To compound 1 a polypropylene homopolymer was added and no curing agent (see comparative experiment B). The thus produced material was further processed into pellets.

Examples 4 and 5 show the melt-mixing of oil-extended EPDM (Keltan P597™) and polypropylene homopolymer (= thermoplastic polymer), oil and a curing agent (phenolic resin) [see example 1] = compound 1. To compound 1 a polypropylene homopolymer was added and curing agent (the phenolic resin) was added [see examples 4 and 5]. The thus produced material was further processed into pellets.

As can be seen from table 3, the tensile strength is increased for the pellets produced according to examples 4 and 5 as compared to comparative experiment B, the oil swell is decreased and the compression set is decreased.

Thus, in view of the amendment made to the claims and the comments/evidence provided above and already of record herein, it should now be evident that Wang et al cannot possibly anticipate the pending claims under 35 USC §102(b). Withdrawal of such rejection is therefore in order.

B. Response to 35 USC §102(b) Rejection based on Komatsu et al (USP 4,873,288)

The differences between the process as described by Komatsu et al include the following:

- In Komatsu et al (see for instance the abstract) a different elastomer is added in the second step, whereas in the process of the present invention, no second (or even third or fourth) elastomer is added.

Please note that from the definition of the applicants' specification, it is clear that a halogenated butyl rubber is *not* a thermoplastic polymer (see description page 2, line 19)

- In step 1 of the process of Komatsu et al, the olefinic rubber is dynamically vulcanized by the peroxide and in step 2, the second rubber (halogenated butyl rubber) is cured by zinc oxide. This most definitely is NOT a two-step curing of the EPDM rubber as zinc oxide by itself is not a good cross-linker for olefinic rubber (as described for EPDM rubber above). In fact, Komatsu et al describe a one step curing of the olefinic rubber and add a second rubber in step 2 which second rubber is also *only cured once by zinc oxide*.

Again, the advantages of the applicants' claimed two-step curing process vs. the one-step curing process of Komatsu et al are as indicated in the description on page 1, line 33 — page 2, line 4 and are proven by the examples provided in the specification as discussed previously in section II.A.

Thus, Komatsu et al cannot possibly anticipate the present invention under 35 USC §102(b).

C. Response to 35 USC §103(a) Rejection based on Komatsu et al

The comments above in II.B are equally germane to the *unobviousness* of the presently claimed invention over Komatsu et al. Specifically, that Komatsu et al disclose only a one-step curing process wherein a once-cured olefinic rubber is blended with a similarly once-cured (i.e., by ZnO) rubber would most certainly not be instructive of the two-step curing process as claimed herein using the curing agents as specified herein.

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Therefore, withdrawal of the rejection advanced under 35 USC §103(a) based on Komatsu et al is in order.

III. Conclusions

Every effort has been made to advance prosecution of this application to allowance. Therefore, in view of the amendments and remarks above, applicant suggests that all claims are in condition for allowance and Official Notice of the same is solicited.

Should any small matters remain outstanding, the Examiner is encouraged to telephone the Applicants' undersigned attorney so that the same may be resolved without the need for an additional written action and reply.

An early and favorable reply on the merits is awaited.

Respectfully submitted,

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